



PATENT SPECIFICATION

DRAWINGS ATTACHED

925.365

Date of filing Complete Specification: Sept. 29, 1961.

Application Date: Sept. 30, 1960.

No. 33599/60.

Complete Specification Published: May 8, 1963.

Index at acceptance:—Classes 64(1), L(2A1:2A2:7U:10); and 126, B45D.

International Classification:—F24b.

COMPLETE SPECIFICATION

Space Heating Appliance

I, ERIC CLIFFORD TURNER, a British subject, of "Monks Hatch", South Road, St. Georges Hill, Weybridge, Surrey, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to fuel-burning domestic heating appliances of the kind constructed for connection to a flue. An object of the invention is to provide for the enclosure of the combustion space in the appliance, whilst maintaining a high degree of heat transference from the appliance to the room in which it may be installed. A further object is to provide a heating appliance of high efficiency providing both radiant and convected heat. Yet another object is to provide a heating appliance of the kind referred to, which can be constructed to burn gaseous, liquid or solid fuels with a minimum of constructional modification.

The invention consists in a heating appliance comprising a combustion chamber, means for admitting combustion air to a lower part of the combustion chamber, a plurality of heat exchanger tubes leading to a register plate for sealing to a flue, means for closing the front of the combustion chamber to constitute a radiant panel, and air permeable front closures for spaces above and below the radiant panel to define, with a casing or recess into which the appliance may be built, a convector passageway leading inwardly from below the radiant panel, round the combustion chamber and outwardly by way of spaces between the heat exchanger tubes.

In a modification in accordance with the invention, part of or all of said convector passageway may be formed by the plurality of heat exchange tubes, means being provided for leading combusted gases over the heat exchange tubes to the flue.

The radiant panel is preferably arranged for

location inwardly of reflectors which extend forwardly from the combustion chamber along the top and bottom thereof to join the top and bottom edge portions of the bottom and upper air permeable closures respectively. In this way, a domestic combined radiant and convector heating appliance of neat and attractive design is readily provided.

The inlet for combustion air to the combustion chamber may conveniently be taken from the aforesaid convector passageway. The combustion chamber is preferably lined on at least one side with a refractory material to aid in the maintenance of combustion. For burning liquid or gaseous fuels, piping with nozzles and control valve means may be fitted along the lower portion of the combustion chamber, whilst for burning anthracite or other solid fuel, the radiant panel may be detachably mounted to facilitate the re-fueling. Alternatively, a centre zone of the upper portion of the convector passageway may be occupied by a hopper for the solid fuel leading directly into the combustion chamber, associated with a closure door. A well-fitting receiver may then be fitted below the combustion chamber, for withdrawal of ash or clinker by way of the bottom entrance to the convector passageway whose closure would then be openable. The air-permeable closures conveniently take the form of wire, expanded metal or perforated sheet grills. Mountings for gas or oil burner pipes provided in the combustion chamber may be utilised for mounting a rocker bottom grate where solid fuel is to be employed, the draught control being brought to the front of the appliance or being accessible by opening of the bottom closure.

In general, the circulation of the air around the back of the combustion chamber and between the heat exchange tubes will be promoted by a fan or other impeller.

According to a further feature of the invention, where solid fuels are to be employed, provision may be made for a blast of com-

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bustion air to be directed across the mouth portion of a feed chamber for block form or comminuted fuel, towards the hereinbefore described radiant panel. This promotes the heating of the radiant panel and at the same time will in general cause ash remaining from the combustion of the fuel to fuse. Separate means may be provided for withdrawal of the fused ash or clinker, which can be lowered progressively at a constant but adjustable rate or under thermostatic control to bring fresh fuel into the path of the air blast across the top of the clinker; alternatively or in addition, in the case of block form fuel, provision can be made for progressively feeding successive blocks downwards. The clinker can be removed in known manner. The fuel may in this case be fed down a sleeve the inlet to which is accessible from above.

Nearly all fuels produce water vapour when they are burnt in oxygen, and this water vapour tends to condense on cool surfaces of heating appliances when they are not fully warmed up; if the water contains corrosive combustion products they may attack the appliance. In the appliance of the present invention, provision may be made for draining condensed water into a reservoir and for heating this reservoir as the appliance warms up to re-evaporate the water.

In the case where block form fuel is used, the fuel may be formed with a series of perforation in each block, or each block may be formed as a sintered mass: this will facilitate the combustion of the interior of the block, and also assist in the formation of a clinker. As another aid to the formation of clinker, the block may be reinforced with a structure, such as steel wire-netting, which is not destroyed by the combustion.

In one embodiment of the invention, for use with block form fuel, a hopper is provided for the fuel leading down a guide-way to the combustion chamber. An impeller, for example an electric fan, is provided in the combustion chamber for blowing a draught of air onto the surface of successive blocks of fuel. The fuel can be initially ignited, for instance electrically or using a gas flame, and burns in the draught of air. A temperature-sensitive means, for instance including a bi-metal strip-operated relay, is provided to allow the fuel to drop below the level of the draught as soon as its combustion falls off appreciably, and its temperature falls: the appliance can usually be designed so that the fuel falls under its own weight, but transfer means for example electrically-operated, may be provided to move the fuel downwardly. The impeller is positioned such that a draught of hot combusted gases is directed onto the aforesaid radiant panel.

The invention will be further described, by way of example, with reference to the accompanying drawings, of which:—

Figure 1 is an elevation, partially cut away, of a heating appliance in accordance with the invention;

Figure 2 is a cross-section of the appliance shown in Figure 1 along the line II—II; and

Figure 3 is a top view of the appliance shown in Figure 1.

The appliance has a combustion chamber 1, the front of the combustion chamber 1 being closed to provide a radiant panel 2. Two extended gas burners 3 are positioned in the lower portion of the combustion chamber, a gas inlet 4 leading to each burner. The positions of the burner nozzles are indicated by schematic flames 5. Inlets 6 are provided for admitting air to the lower part of the combustion chamber 1 and a plurality of heat exchanger tubes 7 lead from the combustion chamber 1 to a register plate 7a for sealing to a flue (not shown) above the appliance. The combustion chamber 1 is lined with a refractory material 1a. The combustion chamber 1 stands supported by side walls 8, and is mounted between a front portion 9 and a rear portion 10. The front portion 9 includes air-permeable front closures 11 and 12, for instance of perforated sheet grill, to define with side-walls 13 and top cover 14 of the front portion 9 and side-walls 15 and top cover 16 of the rear portion 10, a convector passageway leading inwardly from below the radiant panel 2, round the combustion chamber 1 and outwardly by way of spaces between the heat exchanger tubes 7. The direction of convection, when the appliance is operative, is indicated by arrows 17. The front portion 9 also includes reflectors 18 and 19. As shown in Figure 2, trays 20 are provided for collecting any condensed water vapour which the appliance is started up. These trays 20 are positioned so that they are heated when the appliance warms up, the water thus being re-evaporated.

The appliance is shown with the rear of the rear portion 10 up against a wall 21, for instance the rear wall of a hearth. For convenience, it can be arranged that the front portion 9 and the rear portion 10 are separable from the combustion chamber 1.

WHAT I CLAIM IS:—

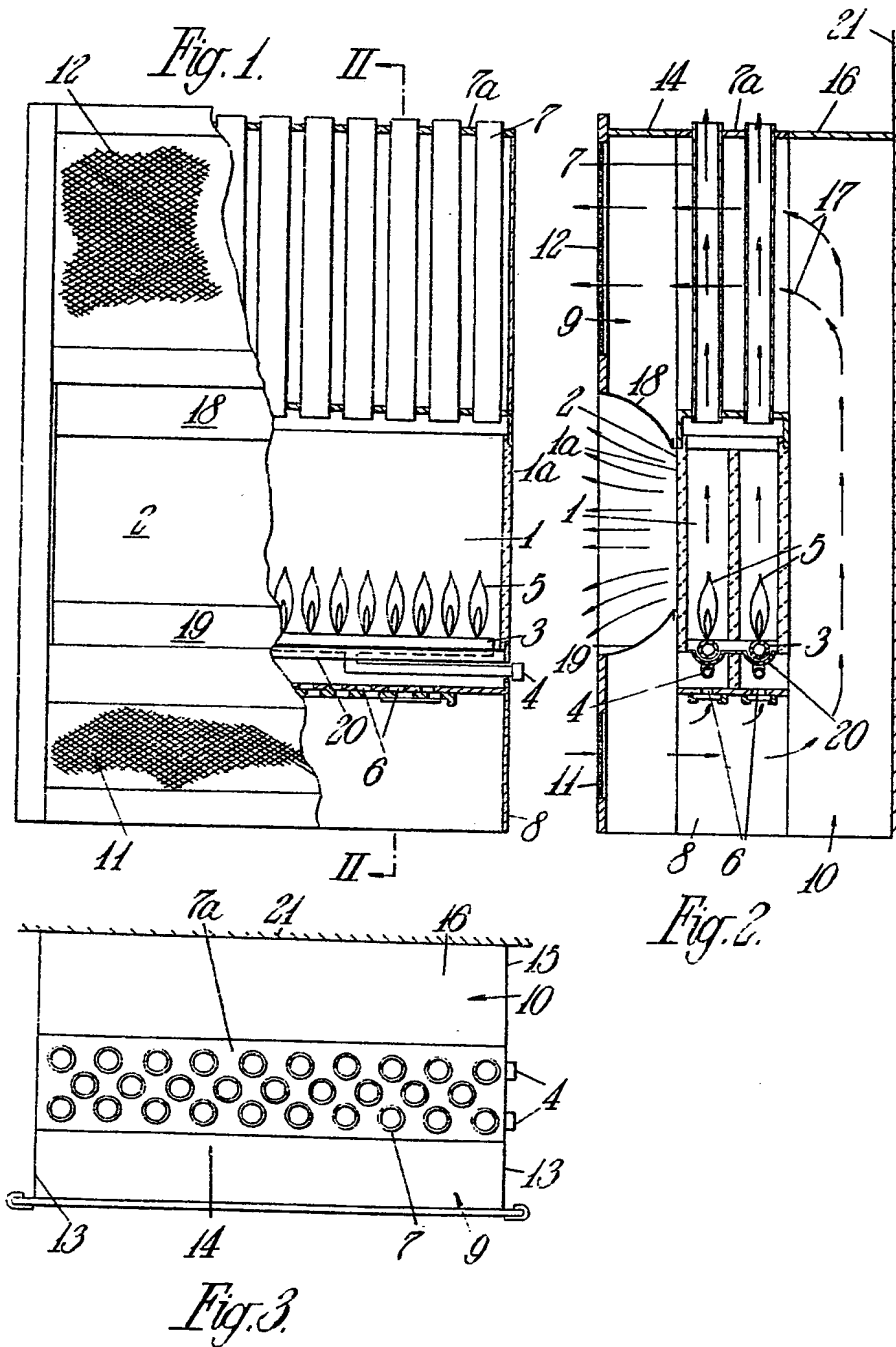
1. A heating appliance comprising a combustion chamber, means for admitting combustion air to a lower part of the combustion chamber, a plurality of heat exchanger tubes leading to a register plate for sealing to a flue, means for closing the front of the combustion chamber to constitute a radiant panel, and air permeable front closures for spaces above and below the radiant panel to define, with a casing or recess into which the appliance may be built, a convector passageway leading inwardly from below the radiant panel, round the combustion chamber and outwardly by way of spaces between the heat exchanger tubes.

2. An appliance according to claim 1

- wherein the radiant panel is arranged for location inwardly of reflectors which extend forwardly from the combustion chamber along the top and bottom thereof to join the top and bottom edge portions of the bottom and upper air permeable closures respectively.
- 5 3. An appliance according to either claim 1 or claim 2 wherein the inlet for combustion air to the combustion chamber is taken from the aforesaid convector passageway.
- 10 4. An appliance according to any of the preceding claims wherein the radiant panel is detachably mounted.
- 15 5. An appliance according to any of claims 1, 2 or 3 wherein a centre zone of the upper portion of the convector passageway is occupied by a hopper for the solid fuel leading directly into the combustion chamber, associated with a closure door.
- 20 6. An appliance according to claim 5 wherein a receiver is fitted below the combustion chamber for withdrawal of ash or clinker by way of the bottom entrance to the convector passageway closure.
- 25 7. An appliance according to any of the preceding claims wherein provision is made for a blast of combustion air to be directed across the mouth portion of a feed chamber for block form or comminuted fuel, toward the hereinbefore described radiant panel.
- 30 8. An appliance according to claim 7 wherein means are provided for lowering fused ash or clinker progressively at a constant but adjustable rate.
- 35 9. An appliance according to claim 8 wherein means are provided for lowering fused ash or clinker under thermostatic control.
10. An appliance according to any of claims 7, 8 or 9 wherein provision is made for progressively feeding successive blocks downwards. 40
11. An appliance according to claim 10 wherein provision is made for feeding the fuel down a sleeve the inlet to which is accessible from above.
12. An appliance according to any of the preceding claims wherein piping with nozzles and control valve means is fitted along the lower portion of the combustion chamber. 45
13. An appliance according to any of the preceding claims wherein the air-permeable closures take the form of wire, expanded metal or perforated sheet grills. 50
14. An appliance according to any of the preceding claims wherein the circulation of air around the back of the combustion chamber and between the heat exchange tubes is promoted by a fan or other impeller. 55
15. An appliance according to any of the preceding claims wherein provision is made for draining condensed water into a reservoir and for heating this reservoir as the appliance warms up to re-evaporate the water. 60
16. An appliance according to claim 1 and as hereinbefore described with reference to the aforesaid one embodiment. 65
17. An appliance according to claim 1 and substantially as hereinbefore described with reference to and as shown in the accompanying drawings.

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